

HIGH EFFECTIVENESS COOLED TURBINE VANE OR BLADE

ABSTRACT OF THE DISCLOSURE

5 [0050] A robust multiple-walled, multi-pass, high cooling effectiveness cooled turbine vane or blade designed for ease of manufacturability, minimizes cooling flows on highly loaded turbine rotors. The inventive vane or blade design allows the turbine inlet temperature to increase over current technology levels while simultaneously reducing turbine cooling to low levels. The invention comprises

10 a complex multi-wall cooling system, which meets the inherent conflict to maximize the flow area of the cooling passages while retaining the required section thickness to meet the structural requirements. Independent cooling circuits for the vane or blade's pressure and suction surfaces allow the cooling of the airfoil surfaces to be tailored to specific head load distributions (that is,

15 the pressure surface circuit is an independent forward flowing serpentine while the suction surface is an independent rearward flowing serpentine). The cooling air for the independent circuits is supplied through separate passages at the base of the vane or blade. The cooling air follows extremely intricate passages to feed the serpentine thin outer wall passages, which incorporate pin

20 fins, turbulators, etc. These passages, while satisfying the aero/thermal/stress requirements, are of a manufacturing configuration that may be cast with single crystal materials using conventional casting techniques.